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EXAMINER
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STARK, JARRETT J

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* PETER W. GREEN

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Appeal 2009-014671  
Application 10/562,293  
Technology Center 2800

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Before JEAN R. HOMERE, ST. JOHN COURTENAY III, and  
THU A. DANG, *Administrative Patent Judges*.

DANG, *Administrative Patent Judge*.

DECISION ON APPEAL

## I. STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from a Final Rejection of claims 24-28. Claims 1-23 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

## A. INVENTION

Appellant's invention relates to fabricating a thin film transistor (TFT) which may be used in an active matrix liquid crystal display (AMLCD) or other flat panel display (Spec. 1, ll. 5-7).

## B. ILLUSTRATIVE CLAIM

Claim 24 is exemplary:

24. A thin film transistor (TFT), comprising:

a gate disposed on a substrate, the gate having side edges inclined towards one another to reach a tip having a radius of a few nanometers;

a gate insulating layer disposed on the gate;

a channel region disposed on the gate insulating layer;

a source electrode overlying a first side edge of the gate,

and

a drain electrode overlying a second side edge of the gate.

### C. REJECTION

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Yamazaki                      US 6,501,094                      Dec. 31, 2002

Claims 24, 25, 27 and 28 stand rejected under 35 U.S.C. 102(b) as being anticipated by Yamazaki.

Claim 26 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki.

### II. ISSUE

The dispositive issue before us is whether the Examiner has erred in determining that Yamazaki teaches “a gate disposed on a substrate, the gate having side edges inclined towards one another to reach *a tip* having a radius of *a few nanometers*” (claim 24, emphasis added). In particular, the issue turns on whether Yamazaki’s gate comprises a tip of a few nanometers in radius.

### III. FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

#### *Yamazaki*

1. Yamazaki discloses a gate electrode 100 formed on a glass substrate 101 (col. 5, ll. 49-50), wherein the gate electrode tapers off to a top portion (Figs. 1A-3D).

2. In particular, Yamazaki discloses forming the gate electrode 100, wherein the aluminum oxide film formed through anodic oxidation has an overall grown length of 100nm (col. 6, ll. 35-37).

#### IV. ANALYSIS

##### *Claims 24, 25, 27, and 28*

As for claim 24, though Appellant admits that Yamazaki “has a flat, plateau-like top that the Examiner calls a ‘tip’” (App. Br. 4), Appellant contends that “the American Heritage Dictionary, for example, defines ‘tip’ as ‘*the end of a pointed or projecting object*’” (App. Br. 3). Accordingly, Appellant asserts that “Yamazaki does not disclose any gate having side edges included towards one another to reach a tip having a radius of few nanometers” (App. Br. 4). Appellant argues that “at most, Yamazaki suggests that the flat plateau at the top of its gate is maybe 200-300 nanometers” which according to Appellant “can hardly be categorized under any definition as ‘a few’ nanometers” (App. Br. 5).

However, the Examiner finds that “the Appellant[] [does] not properly or clearly define how ‘a few nanometers’ is intended to be interpreted” (Ans. 6). In particular, the Examiner finds that “[f]rom the Appellant[’s] disclosure there is no explicit teachings of specific range of values for the radius, which the Appellant[] regard[s] as the invention,” and thus “the limitations have been left open to interpretation” (*id.*). Accordingly, the Examiner finds that “the radius of the tip of the gate electrode [of Yamazaki] has to be less than 50 nm” (*id.*), wherein “a tip with a radius of 50 to 0 nm ... can be considered ‘a few nanometers’” (Ans. 7).

To determine whether Yamazaki teaches “a gate disposed on a substrate, the gate having side edges inclined towards one another to reach a tip having a radius of a few nanometers,” as required by claim 24, we give the claim its broadest reasonable interpretation consistent with the Specification. *See In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). Claim 24 does not place any limitation on what a “tip” means, includes, or represents. Thus, we give the term “tip” its broadest reasonable interpretation as a top or end of an object. In fact, even Appellant contends that “the American Heritage Dictionary, for example, defines ‘tip’ as ‘the end of a pointed or projecting object’” (App. Br. 3, emphasis omitted). Although we do not give any consideration to extrinsic Dictionary evidence, which does not specify a particular version or date, we nevertheless agree that the broadest reasonable interpretation of a “tip” includes an end or top of an object.

Claim 24 also does not place any limitation on what having a radius of a “few” nanometers means, includes, or represents. In fact, claim 24 does not define relative to what number is a “few” nanometers. As the Examiner finds, “[f]rom the Appellant[’s] disclosure there is no explicit teachings of specific range of values for the radius, which the Appellant[] regard[s] as the invention,” and thus “the limitations have been left open to interpretation” (Ans. 6). Thus, we give the term “few” its broadest reasonable interpretation as a small number.

Thus, we give a “tip having a radius of a few nanometers” its broadest reasonable interpretation as a top of a gate having a small radius, as consistent with the Specification and as specifically defined in claim 24.

Yamazaki discloses a gate electrode formed on a glass substrate that tapers off to a top portion (FF 1). We find the gate electrode which tapers off to a top portion to comprise side edges inclined towards one another to reach a top portion, wherein the top portion is the top or end of the projecting gate electrode. In view of our claim interpretation above, we find Yamazaki to disclose a gate disposed on a substrate, the gate having side edges inclined towards one another to reach a tip.

Further, Yamazaki discloses forming the gate electrode, wherein the aluminum oxide film formed through anodic oxidation has an overall grown length of 100nm (FF 2). That is, the gate electrode has a length of 100nm, or a radius of 50nm. Since the gate electrode tapers off, we agree with the Examiner's finding that "the radius of the tip of the gate electrode [of Yamazaki] has to be less than 50 nm" (Ans. 6). In view of our claim interpretation above, we find Yamazaki to disclose a tip having a small radius of a "few" nanometers and, thus, find no error in the Examiner's finding that "a tip with a radius of 50 to 0 nm ... can be considered 'a few nanometers'" (Ans. 7).

As for claim 27, Appellant argues that Yamazaki does not disclose "an insulating material disposed between the gate and the substrate" as required, since "the gate electrode 402/404 is in direct contact with substrate 401 without anything (and specifically without insulating material 407) being disposed therebetween" (App. Br. 6). However, the Examiner finds that "[i]nsulating layer 408 of figure 4c is shown to be disposed between the gate and the substrate" (Ans. 8). We agree with the Examiner.

Claim 27 does not place any limitation on what having "between" means, includes, or represents other than an insulating material is disposed

between the gate and the substrate. Though Appellant argues that gate electrode 402/404 is in direct contact with substrate 401, Appellant appears to be arguing that Yamazaki does not disclose that the insulating material 407 is provided between each and every surface of the gate electrode and the substrate. However, such argument is not commensurate in scope with the language of claim 27 which merely requires that the insulating material is disposed “between” any portion of the gate and any portion of the substrate. Thus, we agree with the Examiner that Yamazaki’s Fig. 4C does disclose that insulating layer 408 is disposed between the gate electrode and the substrate.

Accordingly, we find that Appellant has not shown that the Examiner erred in rejecting claims 24 and 27 and claims 25 and 28, falling with claim 24, under 35 U.S.C. § 102(b) over Yamazaki.

#### *Claim 26*

As for claim 26, though Appellant argues that “[n]o amount of experimentation with Yamazaki with its gate having a flat, plateau-like top would ever produce a device with such a small channel region” (App. Br. 7), the Examiner finds that it would have been obvious to include a channel region having a length of 20-40 nanometers “to determine the optimum thickness, temperature as well as condition of delivery of the layers involved” (Ans. 5). In particular, the Examiner notes that “the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom” (*id.*). We agree with the Examiner.

Although Appellant argues that Yamazaki cannot produce such result, Appellant does not show that such a range is critical by providing evidence



of unexpected results. The Court of Appeals for the Federal Circuit has held that, when the difference between a claimed invention and the prior art is a claimed range, the applicant must show that the range is critical through unexpected results. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) (internal citations omitted).

Accordingly, we find that Appellant has not shown that the Examiner erred in rejecting claim 26 under 35 U.S.C. § 103(a) over Yamazaki.

#### V. CONCLUSION AND DECISION

The Examiner's rejection of claims 24, 25, 27, and 28 under 35 U.S.C. § 102(b) and of claim 26 under 35 U.S.C. § 103(a) is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

peb